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ACEC/NCDOT Spliced Girder Workshop

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Spliced Girder Bridges

- ***Fabricate girders in pieces shorter than final structure***
 - ***For fabrication, handling or transportation***
 - ***Partial or full span segments***
- ***Assembled at site to obtain final structure***
- ***Cast-in-place concrete at splices***
- ***Post-tensioning is typically used to join the pieces***

Spliced Concrete Girders

Makes long-span concrete solutions viable

- ***Provides a new design alternate that leads to improved economy***

Not a new concept

- ***Built in US as early as 1954***

Can lead to dramatic span increases

Details are very important

Overview

- ***Introduction***
- ***Reasons to use spliced girders***
- ***Typical applications***
- ***Basic concepts and special issues***
- ***Examples of spliced girder bridges***
- ***NCHRP Report 517***

Reasons to Use Spliced Concrete Girders

- ***Design Issues***
- ***Construction Issues***
- ***Economical Issues***

Design Issues

Provide longer spans

- ***Avoid placing piers in water***
- ***Avoid other obstacles***
- ***Eliminate piers for safety***
- ***Reduce number of substructure units***
- ***Minimize structure depth***
- ***Reduce number of girder lines***
- ***Eliminate joints***
- ***Improve aesthetics***
- ***Continuity for seismic or impact loads***

Construction Issues

Full-span girders are too large

- ***Fabrication and handling***
- ***Transportation***
- ***Erection***

Depends on

- ***Fabricator's facility and equipment***
- ***Access to the site***
- ***Contractor's preferences and equipment***

Economical Issues

Generally requires a compelling issue

- ***Reduced construction costs***
- ***Reduced fabrication time***
- ***Increased costs for PT***
- ***Increased costs for temporary supports***

***New approaches to contracts where
Contractors are lead party***

- ***Design/Build***
- ***Value Engineering***

Typical Applications

- ***Simple Spans***
- ***Continuous Spans***
- ***Seismic Applications***

Simple Spans

- ***Very long spans***
 - ***Single Point Urban Interchanges (SPUIs)***
- ***Remote sites***
- ***Sites with limited access***
- ***Limitations of fabricator's or contractor's equipment***

Continuous Spans

- ***Very long spans***
 - ***Intracoastal Waterway***
 - ***Other waterways***
 - ***Viaducts***
- ***Minimum depth or fewer girders***
- ***Limited substructure locations***

Seismic Applications

- **Continuity**
- **Integral connection to substructure (integral caps)**
- **Compared to cast-in-place construction**
 - **Eliminate or reduce falsework**
 - **More rapid construction**

Basic Concepts & Design Issues

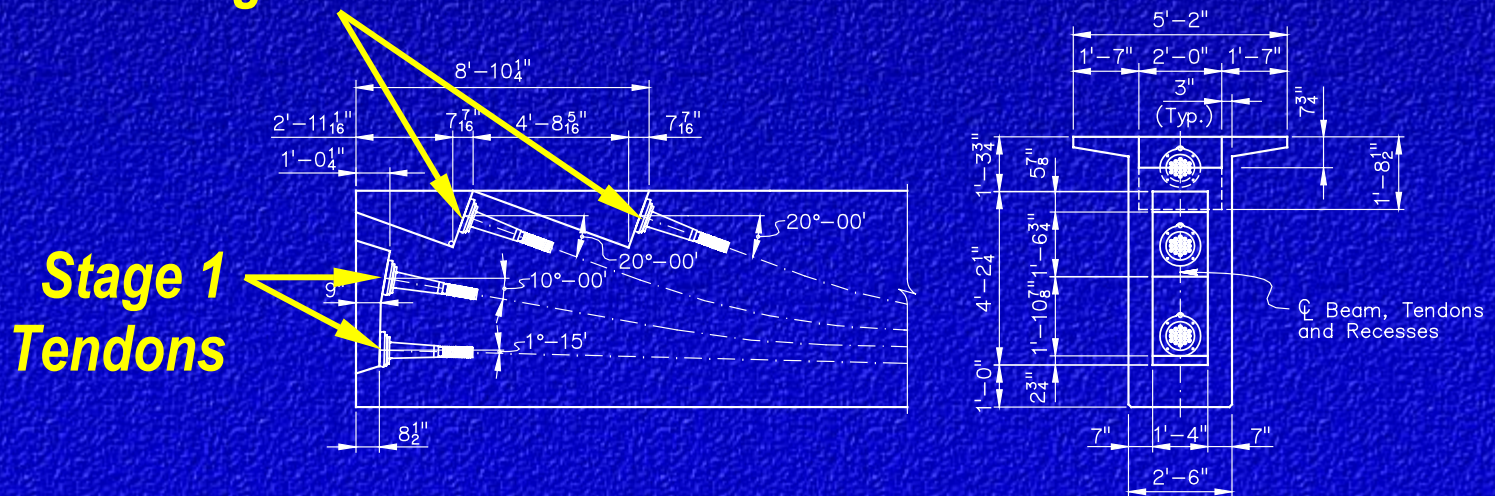
- ***Design issues***
- ***Fabrication details***
- ***Erection details***
- ***Splice details***
- ***Post-tensioning and grouting***

Design Issues

- ***Post-tensioning***

- *Post-tensioned in the field for splicing, often staged*
- *Losses*
- *Secondary moments*
- *Deformations during PT*

Stage 2 Tendons – after deck cast



Design Issues

Restrained deformations

- ***Time-dependent effect may become significant***
- ***More refined analysis***

Cross-section types

- ***I- or Bulb Tee girders***
- ***Open-topped boxes***



Fabrication Issues

Post-tensioning ducts

End blocks and anchorages

Haunched pier segments

More intensive fabrication effort



Erection Issues

Temporary towers

Strong-backs

Launching

Splicing before placement

Splice Details

Duct splicing

Wet joints

Match-cast or machined forms

Shear keys



Post-Tensioning & Grouting

Details

Procedures

Specifications

Inspection

- **Construction**
- **Long-term**



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Examples of Spliced Girder Bridges

Examples of Spliced Girder Bridges

Simple Spans

- ***Remote Site***
- ***Urban Site***

Continuous Spans

- ***Urban Site***
- ***Interstate Crossing***
- ***Rivers & Coastal***
- ***Seismic***

Spliced Concrete Girder Projects

Simple Spans

- ***Klickitat County, WA***
- ***Rock Cut Bridge, WA***
- ***I-15 Reconstruction, Salt Lake City, UT***



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